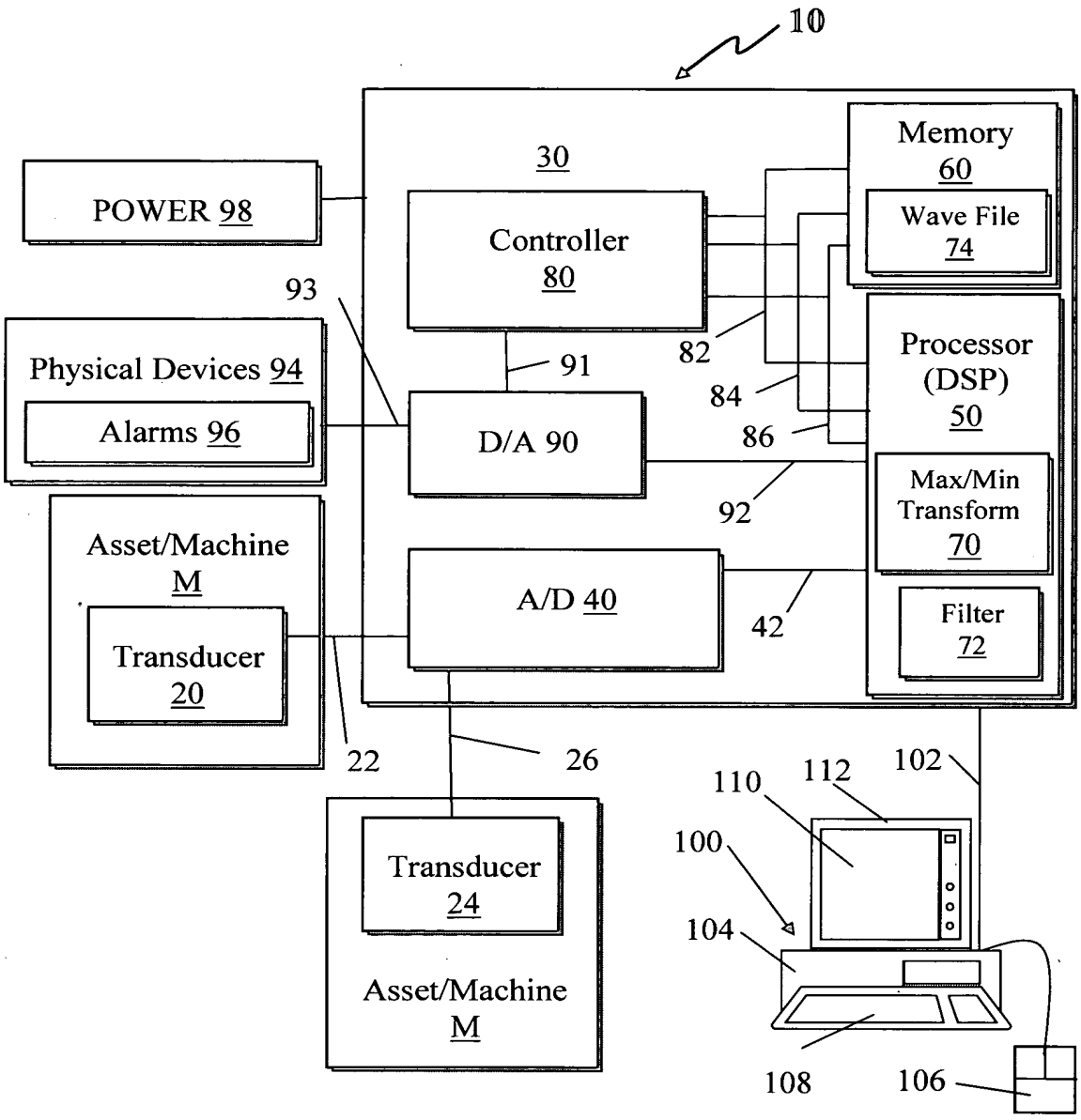
10
30
Memory
60
Wave File
74
POWER 98
Controller
80
93
Physical Devices 94
Alarms 96
91
82
84
Processor
(DSP)
50
D/A 90
86
Max/Min
Transform
70
92
Asset/Machine
M
A/D 40
42
Filter
72
Transducer
20
22
26
102
110
112
100
Transducer
24
104
Asset/Machine
M
108
106

Figure 1

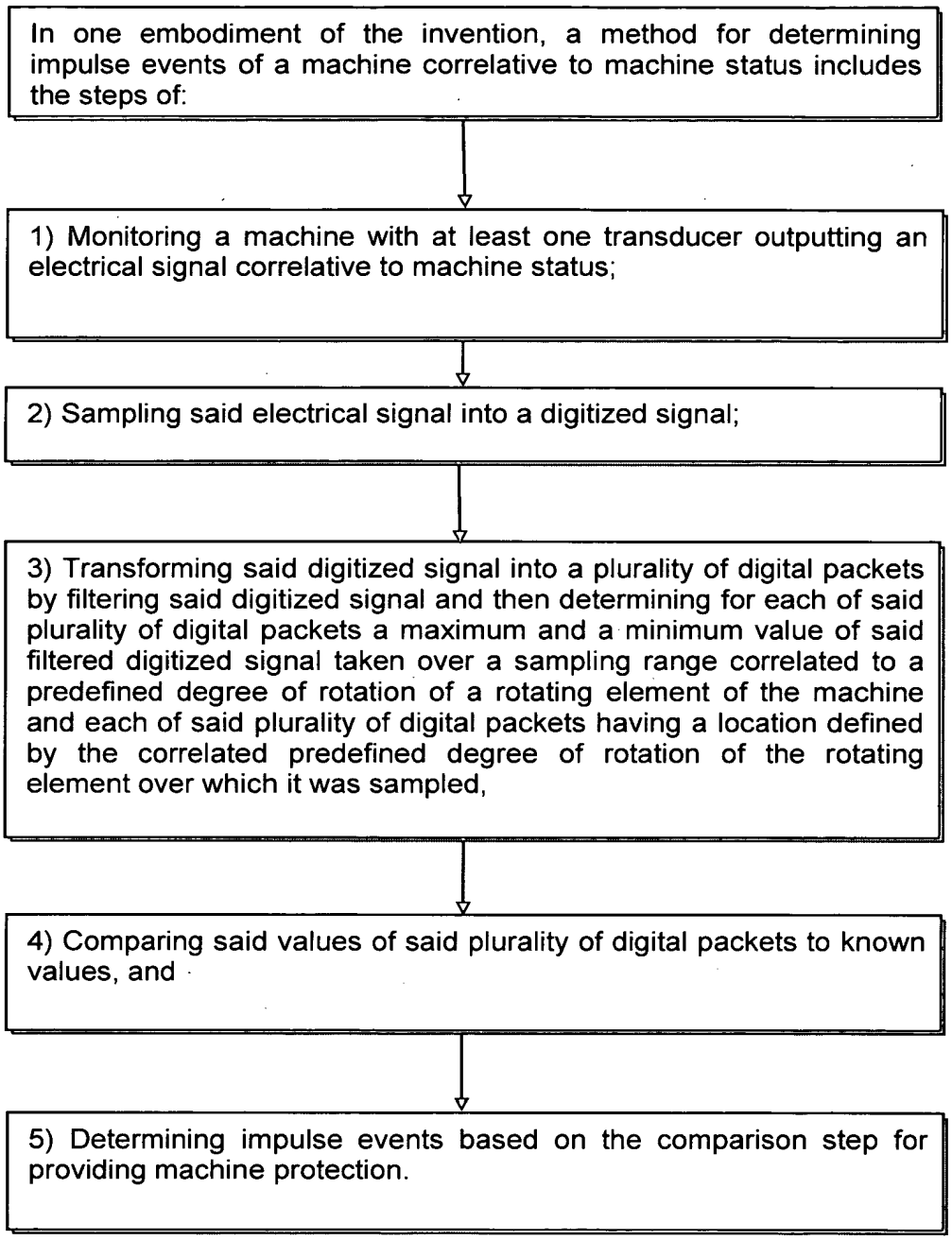
In one embodiment of the invention, a method for determining impulse events of a machine correlative to machine status includes the steps of:
1) Monitoring a machine with at least one transducer outputting an electrical signal correlative to machine status;
2) Sampling said electrical signal into a digitized signal;
3) Transforming said digitized signal into a plurality of digital packets by filtering said digitized signal and then determining for each of said plurality of digital packets a maximum and a minimum value of said filtered digitized signal taken over a sampling range correlated to a predefined degree of rotation of a rotating element of the machine and each of said plurality of digital packets having a location defined by the correlated predefined degree of rotation of the rotating element over which it was sampled,
4) Comparing said values of said plurality of digital packets to known values, and
5) Determining impulse events based on the comparison step for providing machine protection.

Figure 2

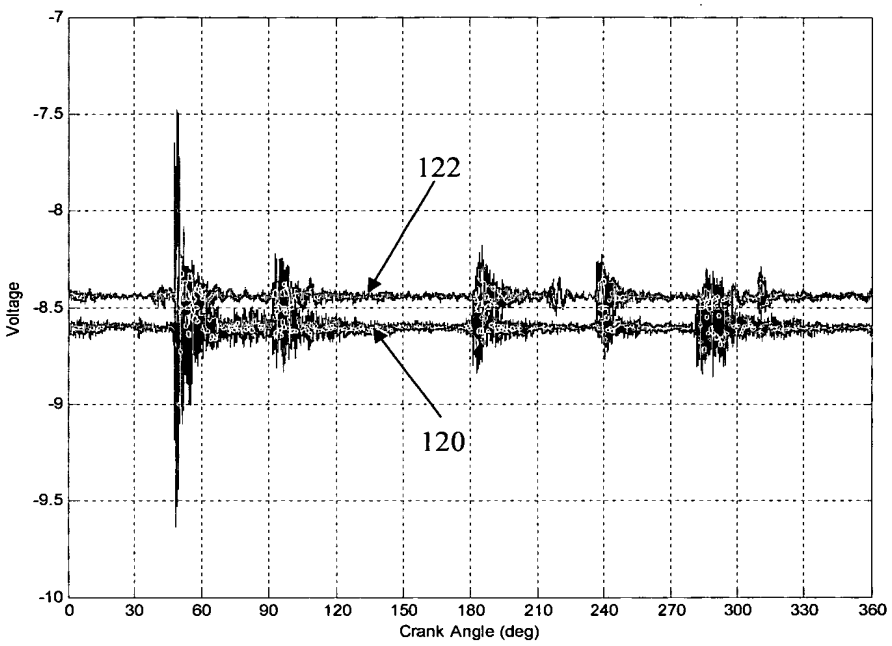
-7
-7.5
-8
-8.5
-9
-9.5
-10
Voltage
0
30
60
90
120
150
180
210
240
270
300
330
360
Crank Angle (deg)
122
120

Figure 3

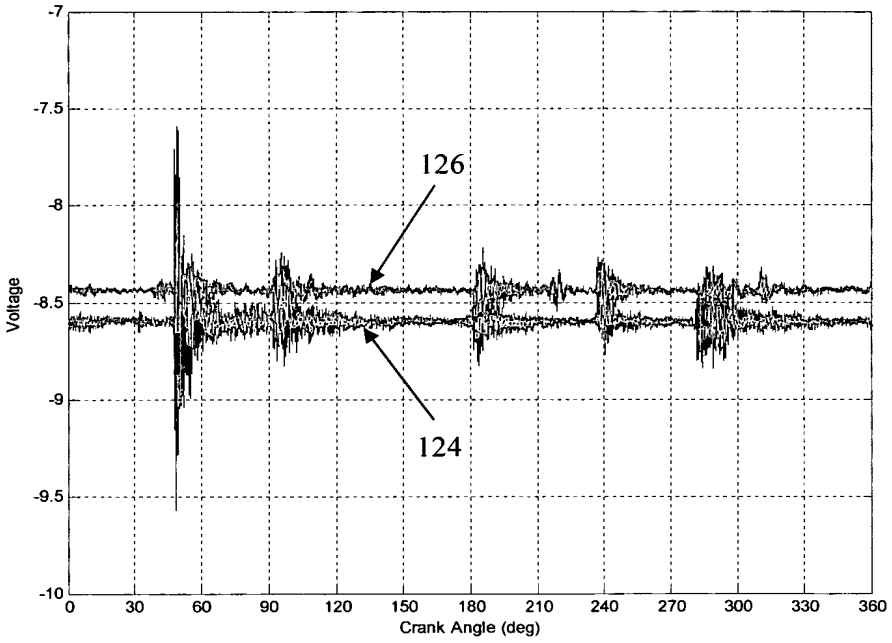
-7
-7.5
-8
-8.5
-9
-9.5
-10
Voltage
0
30
60
90
120
150
180
210
240
270
300
330
360
Crank Angle (deg)
126
124

Figure 4

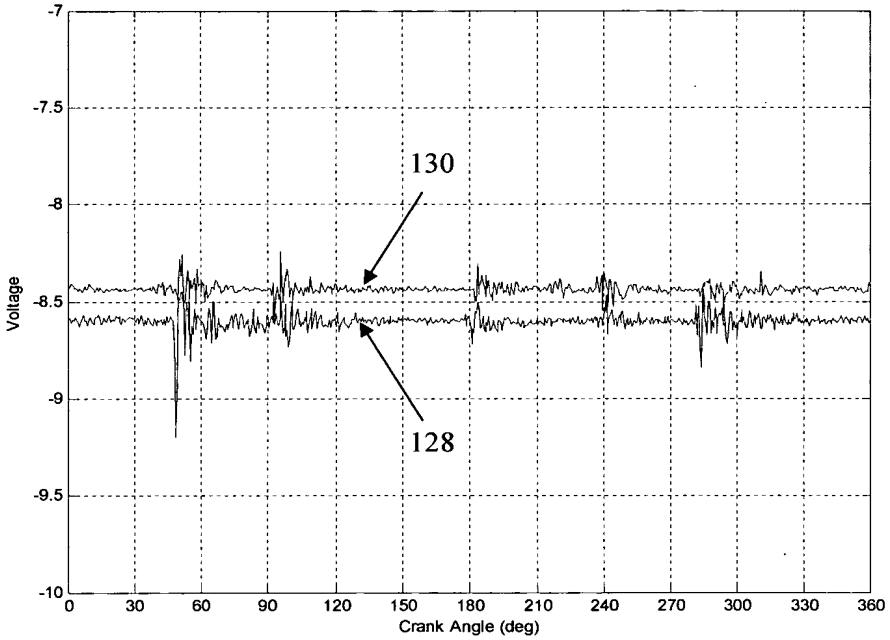
-7
-7.5
-8
-8.5
-9
-9.5
-10
Voltage
130
128
0
30
60
90
120
150
180
210
240
270
300
330
360
Crank Angle (deg)

Figure 5

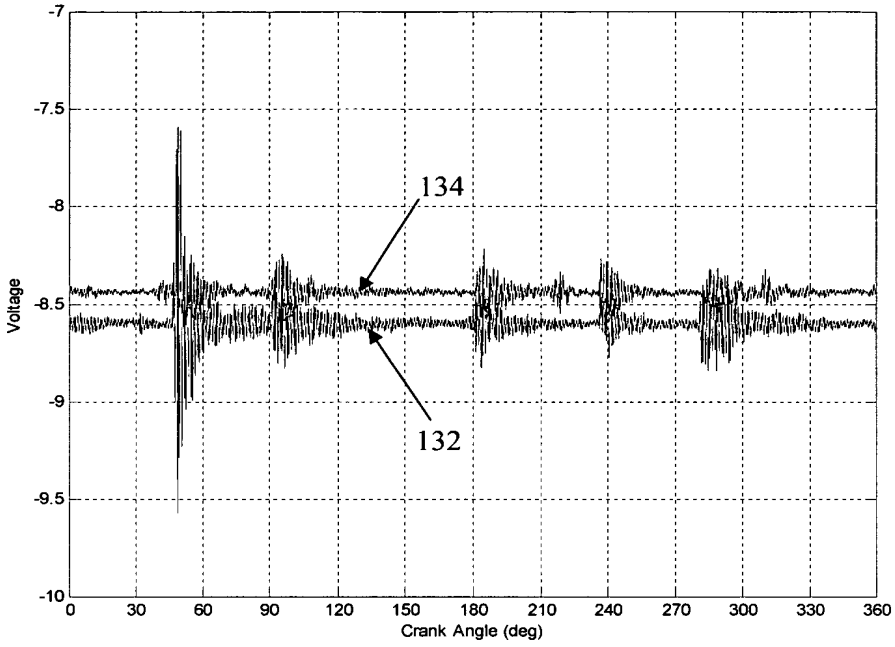
-7
-7.5
-8
-8.5
-9
-9.5
-10
Voltage
0
30
60
90
120
150
180
210
240
270
300
330
360
Crank Angle (deg)
134
132

Figure 6

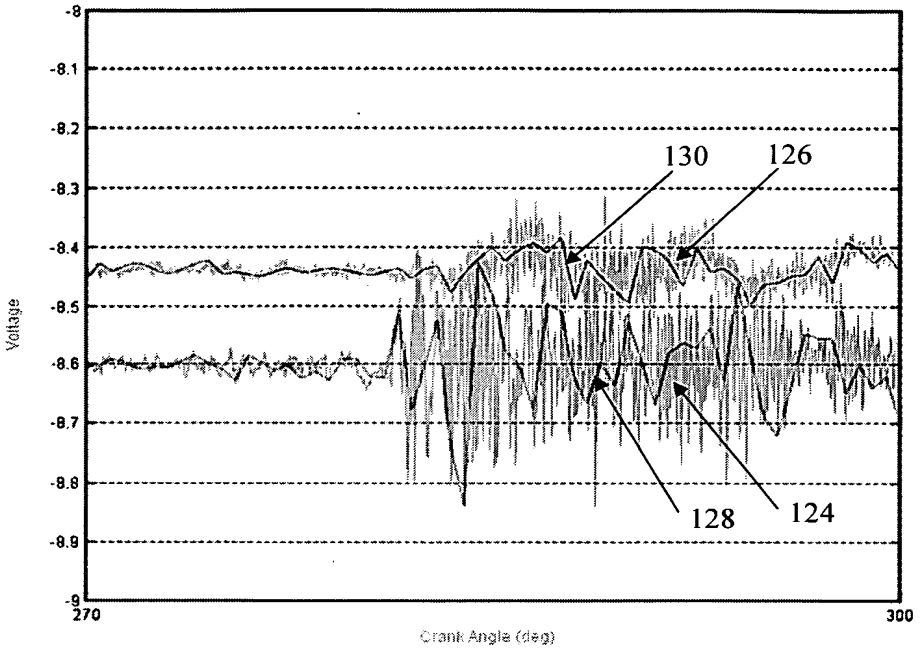
-8
-8.1
-8.2
-8.3
-8.4
-8.5
-8.6
-8.7
-8.8
-8.9
-9
Voltage
270
300
Crank Angle (deg)
130
126
128
124

Figure 7

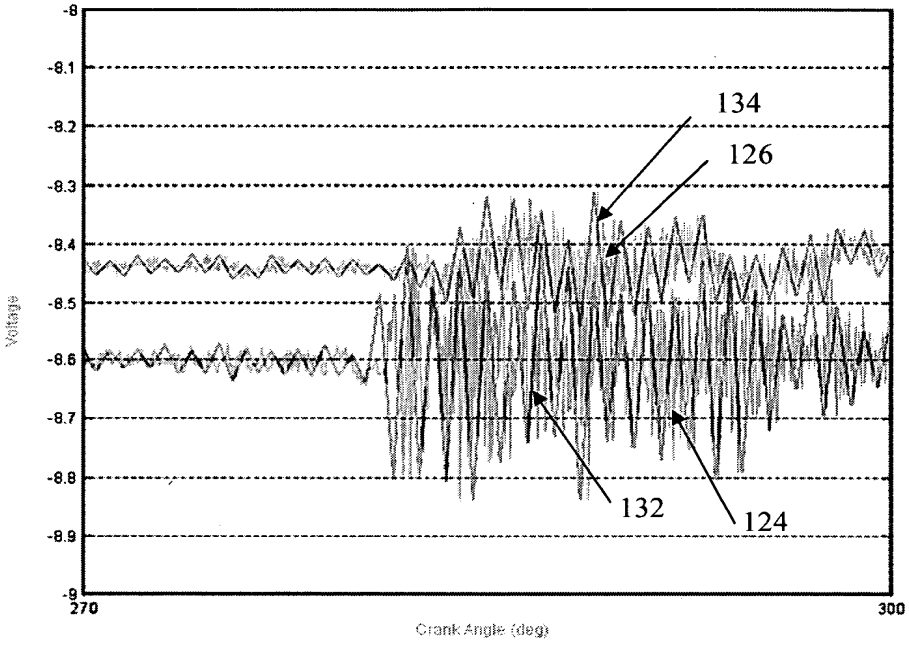
-8
-8.1
-8.2
-8.3
-8.4
-8.5
-8.6
-8.7
-8.8
-8.9
-9
Voltage
134
126
132
124
270
300
Crank Angle (deg)

Figure 8

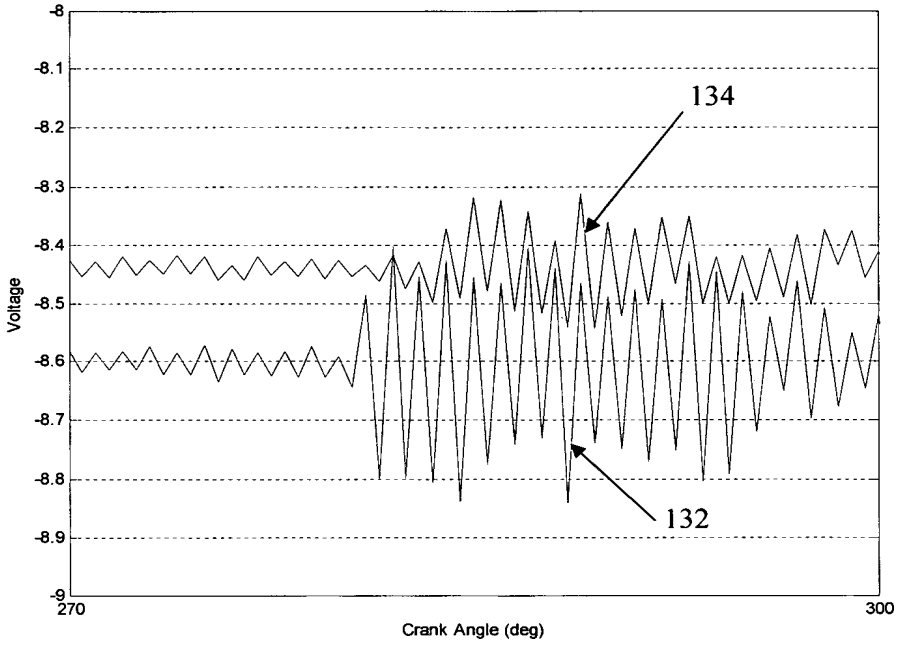
-8
-8.1
-8.2
-8.3
-8.4
-8.5
-8.6
-8.7
-8.8
-8.9
-9
Voltage
270
300
Crank Angle (deg)
134
132

Figure 9

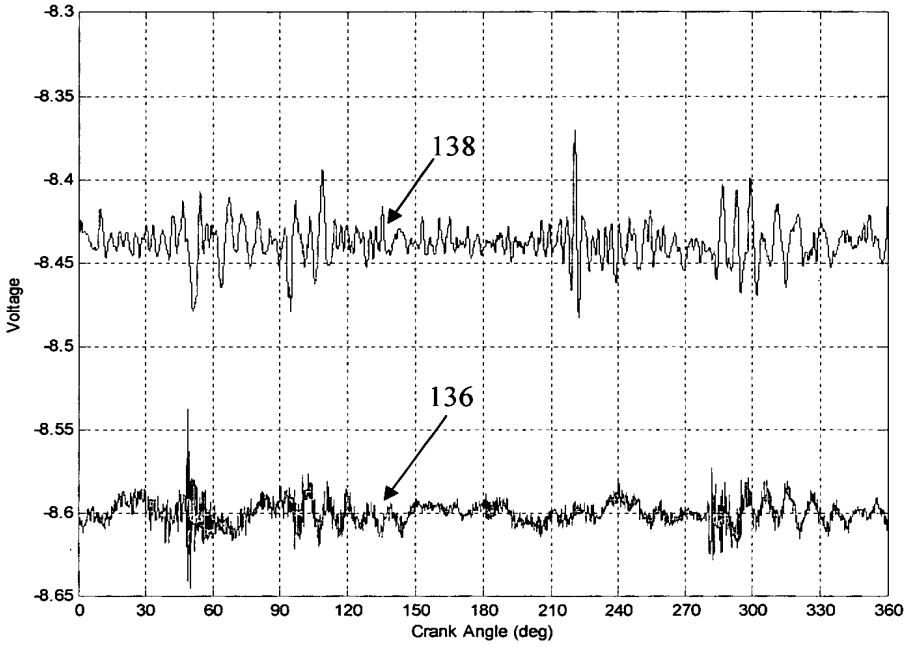
-8.3
-8.35
-8.4
-8.45
-8.5
-8.55
-8.6
-8.65
Voltage
138
136
0
30
60
90
120
150
180
210
240
270
300
330
360
Crank Angle (deg)

Figure 10

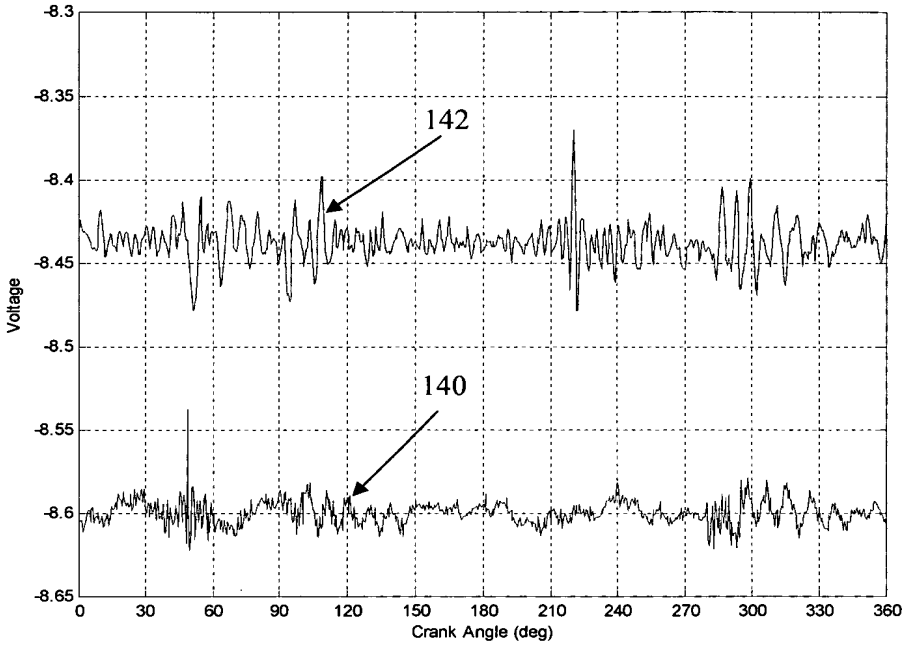
-8.3
-8.35
-8.4
-8.45
-8.5
-8.55
-8.6
-8.65
Voltage
142
140
0
30
60
90
120
150
180
210
240
270
300
330
360
Crank Angle (deg)

Figure 11

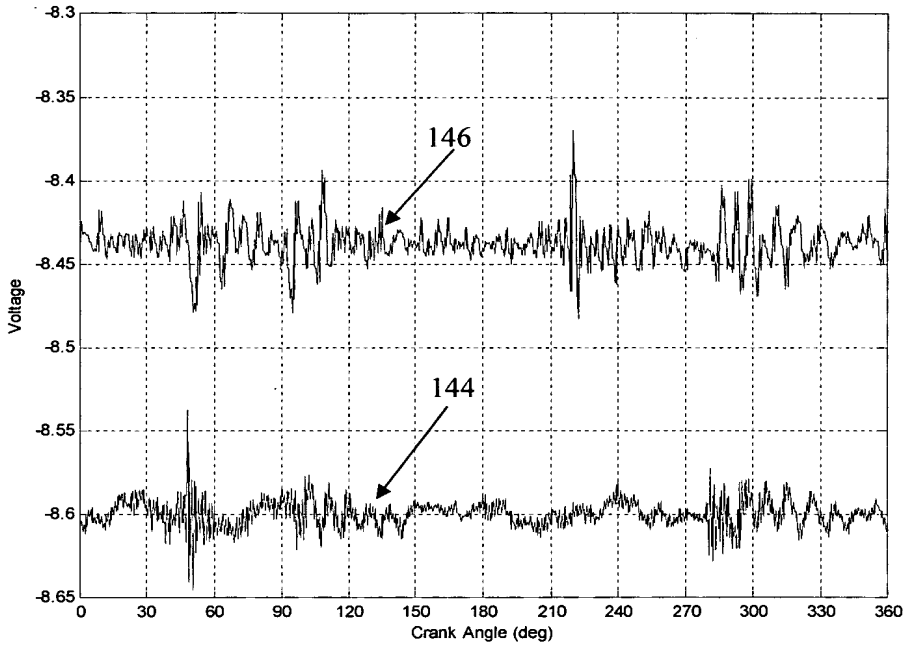
-8.3
-8.35
-8.4
-8.45
-8.5
-8.55
-8.6
-8.65
Voltage
146
144
0
30
60
90
120
150
180
210
240
270
300
330
360
Crank Angle (deg)

Figure 12